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Innovative and Alternative Technology Projects
A Progress Report

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This publication is a progress report on Innovative and Alternative technologies. Projects and description are provided for each.

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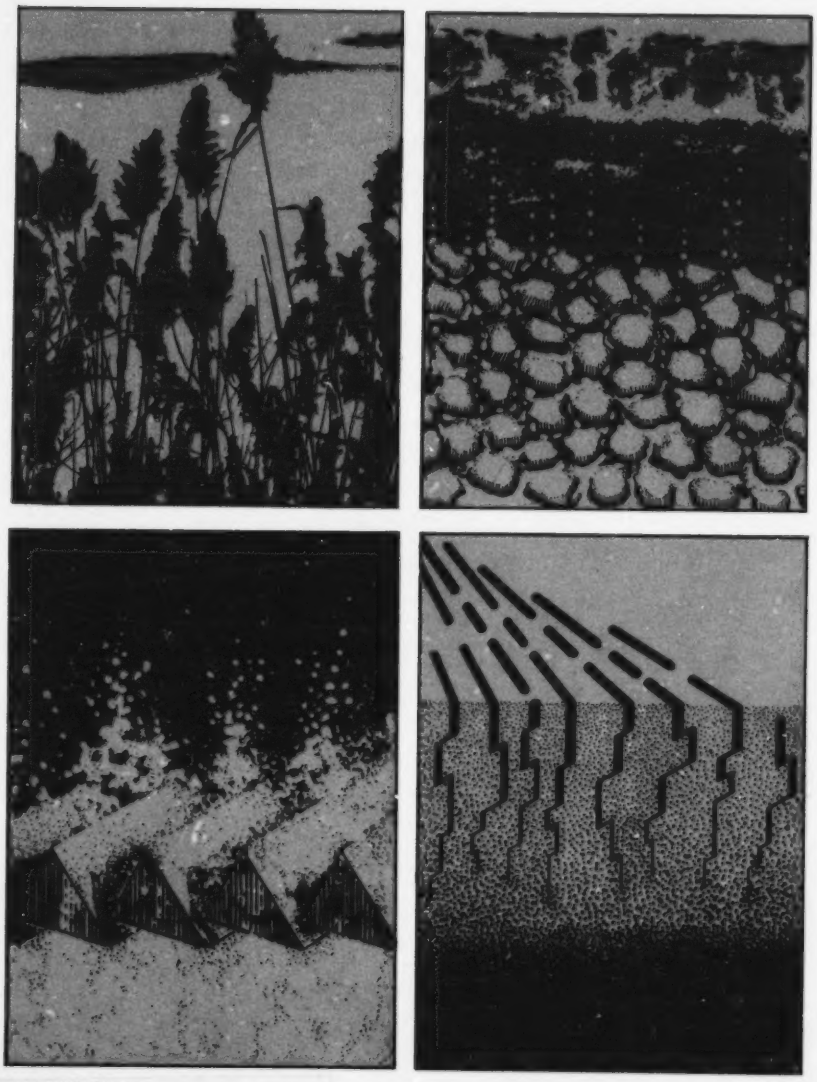
A Progress Report



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OVERVIEW

The Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) authorized a major federal funding program to abate water pollution from municipal treatment facilities. The language of P.L. 92-500 did not define an innovative and alternative (I/A) program, but it did send a clear message that use of the federal grant funds authorized by this law should encourage implementation of alternative technologies. In reviewing progress toward use of alternative technologies in 1977, Congress chose specifically to define and authorize an I/A program in the Clean Water Act (CWA). The language in this law spelled out and strengthened the Congressional mandate that federal funds should encourage use of innovations and alternatives which would conserve and reuse resources.

Specific provisions of the CWA of 1977 established a three-year test program that included a financial incentive, a mandatory reserve fund, and the authority to federally fund correction of failures. The financial incentive came in the form of a ten percent bonus grant for projects which met certain criteria. The criteria established two classes of qualifying projects. Alternative technology projects were eligible by definition and were named in the Environmental Protection Agency (EPA) regulations detailing the provisions of the I/A program. Individual projects or parts of projects could gain eligibility by being designated as innovative on a case-by-case basis.

Overall, the I/A reserve for the three-year test program anticipated increasing participation with time. The reserve was two percent for the first two years and three percent in the third year. The fact that the reserve is used to fund the ten percent difference between a 75 percent and 85 percent grant means that each percent of set-aside controls about ten percent of a state's total grant funds. The authority to use federal funds to correct failures was intended to compensate for the requirement that the applicant must take a risk to participate in a program intended to encourage use of relatively unproven or unfamiliar technologies.

The 1981 amendments to the CWA continued and strengthened the statutory mandate to encourage use of innovative and alternative technologies. The I/A provisions of the CWA of 1977 were extended through fiscal year 1985 with changes that increased the financial incentives and added a provision to fund a new

category of projects designated as field testing. The bonus grant for I/A projects will become a mandatory 20 percent bonus in fiscal year 1985. In the interim, the governor of a state can reduce the federal share for conventional technology projects and, by so doing, increase the bonus up to the maximum 20 percent difference. Some states have exercised this option so that the federal share for their grant applicants is 55 percent for conventional technologies and 75 percent for I/A technologies. The mandatory set-aside was increased to four percent which means that it has been increased from two percent in the first year of the program to four percent or more in the fourth year of the program. Recognizing a need for flexibility, the Congress provided states the option to increase the set-aside up to a seven and one-half percent maximum. The field testing program provides a mechanism to verify the basis of design for promising advances in treatment technology to reduce the risk of failure before funding construction of large projects through the I/A program.

In summary, there has been a consistent statutory trend from 1972 to the present to direct federal funds to the implementation of innovations which are promising but unproven for the proposed use and comparatively unknown alternatives for wastewater treatment. The increasingly stronger mandates of Congress have had substantial effects in a comparatively short time. Response to the I/A program at the local and state level has resulted in over 2,300 grant awards for I/A technologies to over 1,200 grant applicants in a little less than five years. There is every indication that the national response to the program will encourage the Congress to continue strong legislative support when it considers further authorization of the program.

PROFESSIONAL RECOGNITION

Professional engineering societies such as the American Consulting Engineers Council (ACEC), the National Society of Professional Engineers (NSPE), and the Water Pollution Control Federation (WPCF) continue to recognize I/A projects for their engineering excellence. Even before the establishment of the I/A program, projects emphasizing conservation and reuse gained national recognition. For example, the Muskegon County, Michigan project was selected as one of the ten outstanding engineering achievements of 1972 in the United States by NSPE.

Many projects under the auspices of the I/A program have been nominated for national recognition. Of the 72 I/A projects that were completed in 1982, 11 were chosen as finalists by the officers, member firms, and award committees of the ACEC in their 1982 Engineering Excellence Awards Program. Award-winning projects represented a cross section of I/A technologies. The ACEC grand award winner was the vacuum collector/land treatment system in Queen Anne's County, Maryland. The NSPE National Achievement Award Winner was the intrachannel clarification process proposed for the large Jackson County, Missouri wastewater treatment plant.

Tours of the Clayton County, Georgia land treatment-water recycle facility are one of the highlights of the program for the WPCF Annual Conference in 1983.

PROGRAM INFORMATION

The I/A program is approaching the end of its fifth year. Parts of the program are reaching stabilty while others are in a state of transition. The basic provisions of the 1977 law are quite stable as evidenced by the award of over 2,300 grants to design and/or construct over 1,200 facilities with innovative or alternative components. Over $225,000,000 of set-aside funds have been used to provide the ten percent bonus for eligible components of the projects with a total construction cost exceeding $3,000,000,000. The effect of raising the mandatory set-aside to four percent should cause these figures to increase even more rapidly throughout the remainder of 1983 and in 1984. Program staff are processing the first few applications under the provision to provide 100 percent modification and replacement (M/R) funding to correct failures of innovative or alternative components. The new field test program established by the 1981 law is in the early stages of development. With nearly 200 of the I/A-funded facilities now in operation, it is reassuring that we have very few requests for 100 percent M/R funding. There is one field test project already in operation and many other projects are under consideration.

Recognizing the value of specific project information, the Office of Water Programs has compiled several tabulations to provide summary information on the I/A program. Table 1 lists facilities which include components that meet the criteria to receive federal grant funds as innovative. This table lists the type of technology, location, design flow, and consulting engineering firm. Table 2 is a numerical summary of those facilities utilizing a defined alternative technology. This listing is arrayed by EPA region and state to show the geographic distribution of facilities using these technologies. The total number of facilities for each technology is divided to show the number in design or under construction as well as the number already in operation. Table 3 provides additional information as to location, size, and the consulting firm for operating facilities using alternative technologies.

Tables 1 and 3 can be used to make contact with facility owners or consulting firms to obtain additional information on the design, construction, and operation of innovative and alternative technologies. Additional information on the I/A program and individual projects can be obtained from the appropriate state or EPA contacts listed in Table 4.

Program staff have worked diligently to make the listings in these tables as accurate and helpful as possible. Richard E. Thomas, National I/A Coordinator, who is listed in Table 4, should be contacted to correct errors or with suggestions to improve the usefulness of these I/A technology listings.

TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
"AERATION"			
Counter-Current Aeration			
Tuskegee, AL	2.0	-	-
Boaz, AL	4.1	-	-
Hillsborough Co., FL	1.5	-	-
Troy, NC	0.84	-	-
E. Richland, SC	-	-	-
Clairborne Co., TN	0.32	-	-
Portland, TN	1.0	-	-
Jonesboro, TN	0.5	-	-
Springfield, TN	3.44	-	-
Dome Diffused			
(1)Brockton, MA	18.0	cost & energy	Fay, Spofford & Thorndike, Inc.
(1)Madison Nine Springs, WI	50.0	Reg. discr.	O'Brien & Gere
Meriden, CT	11.6	-	C. E. Maguire, Inc.
Draft Tube			
Atmore, AL	2.0	energy	-
Fairfield, IA	2.8	energy	French, Raneker & Assoc.
Montgomery, NY	0.5	cost	Ericson, Silva & Assoc.
Monticello, NY	2.5	cost	Ericson, Silva & Clark
Thompson, NY	0.8	cost	Clark, Ericson, Silva
Submerged Turbine Draft Tube			
Cranston, RI	23.0	energy	Universal Engineering Corp.
U-Tube			
(1)Grottoes, VA	0.2	energy	-
"CLARIFIERS"			
Aerated Clarifier			
(1)Choctaw, OK	0.5	Reg. discr.	Rea Engineering & Assoc., Inc.
Decantor Clarifier			
(1)Grottoes, VA	0.2	energy	Brennenan Engineers
Fixed-Media Clarifier			
(1)Waynesburg, OH	0.4	energy	-

(1)Indicates that this facility is listed under more than one innovative technology.
(2)Indicates that this facility is operational.

TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Flocculating Clarifier			
Central Valley, UT	50.0	energy	Brown & Caldwell/Koon, King & Knowlton
Denmark, WI	0.5	Reg. discr.	-
(1)Madison Nine Springs, WI	50.0	Reg. discr.	O'Brien & Gere
Inclined Plate Settler			
(2)Sanford, ME	3.6	Reg. discr.	Environmental Engineers, Inc.
Intra-Channel or Integral Clarifiers			
Bismark, MO	-	cost & energy	Kleberger & Assoc.
Little Blue Valley, MO	1.4	cost & energy	Burns & McDonnell
Natchitoches, LA	6.5	cost & energy	Beard Engineering, Inc.
Owensboro, KY	6.8	-	-
(1)Suffern, NY	1.8	cost	Thomas Riddick Assoc.
Tube Settlers w/Chlorination			
(1)Flagstaff, AZ	6.0	cost	Brown & Caldwell
"COLLECTION SYSTEM"			
Collection of Septic Tank Effluent			
Kenneth, MN	0.01	Reg. discr.	McCombs-Knutson, Assoc.
(1)Lake Monroe, IN	0.039	cost	Beam, Longest & Neff
(1)Lincoln, MT	0.11	env. ben.	Stahly Eng. & Assoc.
CSO Treatment			
Ogdensburg, NY	6.5	cost	Lombardo Associates, Boston
Peoria, IL	-	cost	Randolph & Assoc.
Small Diameter Gravity Collection			
(1)Crawford, NY	0.15	cost	Philip J. Clark, Engineers, Inc.
(1)Woodstock, NY	0.2	cost	Lombardo Assoc. of Boston
"DISINFECTION"			
UV Disinfection			
Albert Lea, MN	3.4	-	Toltz, King, Duvall, Anderson & Assoc.
(2)Cassville, MO	0.5	-	Allgier, Martin & Assoc.
(1)Choctaw, OK	0.5	Reg. discr.	Rea Engineers & Assoc., Inc.
Clear Spring, MD	0.2	-	-
(1)Crawford, NY	0.15	cost	Phillip J. Clark, Engineers, Inc.

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TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Deep River, CT	0.088	-	C. E. Maguire, Inc.
Dexter, ME	0.54	Reg. discr.	Coffin & Richardson, Inc.
Evanston, WY	2.9	cost	Eckhoff, Watson & Preator
(2)Hesston, KS	0.586	env. ben.	Wilson & Co., Engineers and Architects
Kennebunkport, ME	-	Reg. discr.	Edward C. Jordan Co., Inc.
Knife River, MN	0.04	-	-
(1)(2)Lamar, AR	0.011	env. ben.	Burrough, Verling, Braswell, Inc.
(1)Madison Nine Springs, WI	50.0	Reg. discr.	O'Brien & Gere
Marietta, OK	0.31	Reg. discr.	Robert L. McCoy
Northfield, MN	2.5	Reg. discr.	Bonestroo, Rosene, Anderlik & Assoc.
Pella, IA	2.28	Reg. discr.	Veenstran & Kimm
Rhinebeck, NY	0.129	Reg. discr.	Brinnier & Larios
Smithburg, MD	0.2	cost	Fellows & Reed
(1)Suffern, NY	1.8	cost	Thomas & Riddick
Thurmont, MD	1.0	-	-
(1)Waynesburg, OH	0.4	energy	-
(1)Woodstock, NY	0.2	cost	Lombardo Associates, Boston
Ozonation			
Moorhead, MN	6.0	Reg. discr.	Watermation, Inc.
Pre-Ozonation			
N.E. Ohio, OH	50.0	-	Engineering Science
"DISPOSAL OF EFFLUENT"			
Deep Well Injection of Effluent			
(1)St. Petersburg, FL	60.5	cost	-
Subsurface Filter/Surface Discharge			
Lee County, FL	10.0	cost & energy	-
Town of Newport, VT	0.4	env. ben.	Phillips & Emberley, Inc.
Water Supply/Aquifer Recharge			
(1)El Paso, TX	10.0	env. ben.	Park Hill, Smith & Cooper, Inc.
"ENERGY CONSERVATION AND RECOVERY"			
Active/Passive Solar Heating			
(1)Hillsborough, NH	0.45	energy	Anderson-Nichols Assoc., Inc.

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TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Active Solar Heating			
City of Newport, VT	1.2	energy	Webster-Martin, Inc.
Energy Recovery/Heat Pumps			
Hastings, NE	5.7	-	Henningson, Durham & Richardson
(1)Hillsborough, NH	0.45	energy	Anderson-Nichols Assoc., Inc.
Hydrogelectric Generating Station			
Bonney Lake, WA	2.0	energy	Phillip M. Botch & Assoc.
Solar Collectors/Energy Conservation			
Pine River, MN	0.25	Reg. discr.	D. L. Floan
Solar Power System			
(1)Waynesburg, OH	0.4	energy	-
Solar Space Heating			
Cornelia, GA	3.0	-	-
(2)Jackson, WY	3.5	energy	ARIX
Gaffney, SC	3.2	-	-
Lake Monroe, IN	0.039	cost	Beam, Longest & Neff
Supplemental Solar Heating			
(1)Flagstaff, AZ	6.0	energy	Brown & Caldwell
Digester Gas Power Generation			
(1)Henderson, NC	4.14	env. ben. & reliability	-
Cullman, AL	4.75	-	-
Los Angeles, CA	-	energy	Los Angeles Co. Engineers
(1)Rochester, MN	19.1	energy	Kirkham-Michael & Assoc.
Use Waste Steam from Power Plant			
Waukesha, WI	11.6	energy	Alvord, Burdic & Howson
Waste Heat Recovery			
North Tulsa, OK	30.0	Reg. discr.	Black & Veatch/Fell, Brusso, Bruton & Knowles

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TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
"FILTRATION"			
Continuous Clean Tertiary Sand Filter			
Eveleth, MN	1.7	cost & energy	Robert R. Wallace & Assoc.
One Cell Lagoon/Dual Sand Filter			
Hanover, IL	0.1	cost	Fehr, Graham & Assoc.
Hoyleton, IL	0.05	cost	Watwood & Pyle, Inc.
Mill Shoals, IL	0.04	cost	Henry Meisenheimer and Gende
Prairie du Rocher, IL	0.06	cost	J. T. Blankinship & Assoc.
St. Elmo, IL	0.3	cost	Hurst-Rosche Engineers
Tamms, IL	0.08	cost	Warren and Van Praag
Grant Park, IL	0.3	-	-
Floating Dredge Sand Filter			
Green River, WY	1.5	Reg. Discr.	Culp, Wesner, Culp
Intermittent Sand Filtration			
Henderson, NV	5.3	-	U.R.S. Engineers
Microscreens			
Burley, ID	2.25	cost & energy	CH_2M Hill
Newton, MS	0.77	-	Wayne Watts, Engineer
Scottsbluff, NE	3.14	-	John E. Olsson & Assoc.
Sterling, CO	3.88	Reg. discr.	ARIX
Recirculating Rock Filter			
Contra Costs, CA	0.165	energy	CDM/KKA Consultants
Marionville, MO	0.73	cost	Hood-Rich
Seymour, MO	0.2	cost	Hood-Rich
Southwest City, MO	0.124	cost	Hood-Rich
Recirculating Sand Filter			
Lane, OR	0.044	energy	Kramer, Chin & Mayo
Mendocino, CA	0.01	energy	-
Miranda, CA	0.046	energy	Winzley & Kelly
Sadieville, KY	0.03	-	-
Alton, MO	0.1085	Reg. discr.	Crane & Flemming Company
Mountain View, MO	-	Reg. discr.	Crane & Flemming Company
Slow Rock Filter			
(1)West Monroe, LA	5.6	-	-

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TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
"LAGOONS"			
Deep Lagoons			
(1)Grottoes, VA	0.2	energy	Brennenan Engineers
Facultative Lagoons			
Bristol Bay, AK	0.15	cost & energy	Tryck, Nyman & Hayes
Holbrook, AZ	1.3	energy	John Corollo Engineers
Hydrograph Controlled Release Lagoon			
Blountsville, AL	0.275	-	-
(1)Butler, AL	0.5	energy	-
Canton, MS	3.5	-	Willis Engineers
Courtland, AL	0.15	cost & energy	-
Folkville, AL	0.27	cost	-
Heidelberg, MS	3.5	-	C. B. Holder & Assoc.
Linden, AL	0.45	-	-
Raleigh, MS	0.2	-	Cook-Coggin Engineers
Valden, MS	0.15	energy	Barth & Assoc.
West Monroe, LA	5.6	-	-
Lagoon in Lieu of Chlorination			
Canton, ME	0.04	Reg. discr.	Woodward & Curran, Inc.
"LAND APPLICATION OF EFFLUENT"			
Aquaculture			
(1)Woodstock, NY	0.2	cost	Lombardo & Assoc.
Duckweed			
Paragould, AR	2.2	Reg. discr.	Black & Veatch
Overland Flow			
Alma, AR	1.27	-	-
Arcadia, LA	0.515	env. ben.	Balar and Assoc.
Castor, LA	0.03	env. ben.	S. M. Cothren
Cleveland, MS	3.0	energy	Clark Dietz Engineers
Corsicana, TX	1.0	energy	Gilbreth & Assoc.
Esterwood, LA	0.018	env. ben.	Alex Theriot, Jr. & Assoc.
Forrest Hill, LA	0.06	env. ben.	Alex Theriot, Jr. & Assoc.
Franklinton, LA	0.74	env. ben.	N-Y & Assoc.

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Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Hall Summit, LA	0.056	env. ben.	Alex Theriot, Jr. & Assoc.
Heavener, OK	0.45	env. ben.	Alford Engineering Co.
(1)Lamar, AR	0.11	env. ben.	Burrough, Verling, Braswell, Inc.
Morse, LA	0.09	env. ben.	Alex Theriot, Jr. & Assoc.
Oppelo, AR	0.12	env. ben.	Affiliated Engineers
Vinton, LA	1.0	env. ben.	Roy F. Weston
Wabbaseka, AR	0.104	env. ben.	Affiliated Engineers
Norwood, LA	0.035	other	US Environmental Planners
Rapid Infiltration			
Henderson, NV	6.5	cost	U.R.S. Engineers
Laramie, WY	5.0	cost	ARIX
(1)Lincoln, MT	0.11	env. ben.	Stahly Engineers & Assoc.
Madison, SD	1.8	cost	Banner Assoc., Inc.
Waycross, GA	7.0	-	-
Silviculture			
Dalton, GA	40.0	reliability	-
Eagle Lake, ME	0.023	env. ben. & reliability	Carroll & Taylor & Assoc.
Eagle Lake, ME	0.146	env. ben. & reliability	Carroll & Taylor & Assoc.
Spray Irrigation			
(1)Butler, AL	0.5	energy	-
Carson City, NV	6.8	cost	Vasey Engineers
Dalton, GA	40.0	-	-
Elko, NV	2.5	cost	Chilton Engineers
Heber Valley, UT	2.5	Reg. discr.	Horrocks Engineers
Hilton Head, SC	0.8	-	-
(1)St. Petersburg, FL	60.5	cost	-
Wells, NV	0.27	cost	Consultant Engineers' Services, Inc.
Steep Slope Spray Irrigation			
Craigsville, VA	0.25	env. ben.	Betz, Converse & Murdock
Water Hyacinths			
Austin, TX	26.0	energy	Park, Hill, Smith & Cooper, Inc.
Wilton, AR	0.09	env. ben.	McClelland Consulting Engs. Inc.

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TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Wetlands			
Incline Village, NV	2.14	cost	CH_2M Hill Engineers
(1)Norwalk, IA	0.633	env. ben.	Associate Engineers, Inc.
Riverside, IA	-	env. ben.	Shive-Hattery & Assoc.
St. Paul, KS	-	env. ben.	Shetler, Griffith & Shetlar
"NITRIFICATION"			
Fixed Growth Biological Nitrification			
Redwood Falls, MN	0.7	Reg. discr.	-
Pure Oxygen/Single Stage Nitrification			
Indianapolis, IN	125.0	Reg. discr.	Reid, Quebe, Allison Wilcox & Assoc.
Upflow Packed Bed Nitrification			
Upper Eagle Valley, CO	3.2	cost	M&I Engineers
"NUTRIENT REMOVAL"			
Bardenpho			
Payson, AZ	2.4	cost	Moore Nicklebacker
Ft. Meyers, FL	24.0	-	-
Chemical Addition via Motor Boat			
Albany, MN	0.4	cost	Rieke-Carroll-Muller & Assoc.
PhoStrip			
Amherst, NY	12.0	cost	Neussbuner, Clark & Velzy
(1)Brockton, MA	18.0	cost & energy	Fay, Spofford & Thorndike, Inc.
Reno, NV	30.0	cost	Kennedy, Jenks Engineers
(1)Rochester, MN	19.1	energy	Kirkham-Michael & Assoc.
Biofilter/Diffused Air TKN Removal			
Oakland, MD	0.9	-	Fridy, Inc.
Water Valley, MS	1.4	-	-
Waste Pickle Liquor/P Removal			
Baltimore, MD	170.0	Reg. discr.	-

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TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Anoxic/Oxic System			
Chatham, VA	0.45	-	-
Lancaster, PA	30.0?	-	-
Largo, FL	13.0	-	-
"OXIDATION DITCH"			
Carrousel Oxidation Ditch			
Mount Holly Springs, PA	0.3	cost & energy	Tracy Engineers
Draft Tube Oxidation Ditch			
Crab Orchard, WV	1.0	-	-
Eufaula, AL	2.55	-	-
Foley, AL	1.0	-	-
Hallstead, PA	0.35	-	-
Keysville, VA	0.03	cost & energy	May-Heines & Assoc.
Opelika, AL	0.94	-	-
Sante Fe, NM	6.5	energy	Scanlon & Assoc., Inc.
South Hill, VA	1.0	energy	-
Oxidation Ditch			
King George County, VA	0.05	Reg. discr.	Gilbert W. Clifnor
Smithfield, VA	0.5	Reg. discr.	R. Kenneth Weeks
Southhampton County, VA	0.303	Reg. discr.	Henry T. Sadler
"RBC's"			
Hydraulically Assisted RBC's			
Hardinsburg, KY	0.73	energy	-
Air Driven RBC's			
Oakview, CA	1.0	cost & energy	James Montgomery Engineers
Bi-level Structured RBC Plant			
Elsah, IL	0.05	cost	Watwood & Heavener
"SLUDGE TECHNOLOGY"			
Thickeners, Belt Filter Presses			
(1)Cape May Co., NJ	6.3	Reg. discr.	Pandullo, Quirk & Assoc.

(1)Indicates that this facility is listed under more than one innovative technology.
(2)Indicates that this facility is operational.

TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Carver-Greenfield			
Los Angeles, CA	-	energy	Montgomery & Paterson
Belt Filter Presses With Lime Feed			
Ewing-Lawrence, NJ	18.0	cost & energy	Buck Siefort & Jost
Vacuum Sludge Drying Beds			
Gilman, IL	0.5	Reg. discr.	Jerry Lacy & Assoc.
Nevada City, CA	-	energy	-
Portage, IN	3.5	Reg. discr.	American Engineering
Union City, IN	1.5	Reg. discr.	M. W., Inc.
Vacuum/Belt Series			
Oklahoma City, OK	40.0	energy	Benham-Blair & Affiliates, Inc.
Disposal			
Co-Disposal			
ECO-Rock, PA	250.00	env. ben.	Greeley & Hansen
Facultative Sludge Lagoons			
(1)Flagstaff, AZ	6.0	cost & energy	Brown & Caldwell
Odor Control for Sludge Lagoons			
Sacramento, CA	-	cost & energy	Sacramento Area Consultants
Traveling Guns to Land Apply Sludge			
Grand Strand, SC	6.0	cost	-
Incineration			
Chromium Detoxification of Fluidized Bed Ash			
S. Essex, MA	41.0	Reg. discr.	Tighe and Bond
Co-Incineration			
Glen Cover, NY	8.0	Reg. discr.	Wm. F. Cosulick & Assoc./E. F. W. Frank
Macon Co., GA	14.0	cost	-
Memphis, TN	80.0	cost & energy	-
Pure Oxygen Fluidized Bed System			
Nassau Co., NY	10.0	Reg. discr.	Consoer, Townsend & Assoc.

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(2)Indicates that this facility is operational.

TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Starved Air Combustion of Sludge			
Greensboro, NC	20.0	-	-
St. Louis, MO	167.0	energy	Consoer, Townsend & Assoc.
Sludge Composting			
Aerated Static Pile Composting			
Myrtle Beach, SC	12.5	env. ben. & reliability	-
Invessel Mechanical Composting			
Brunswick, GA	10.0	-	-
New York, NY	280.0	cost	NY City/Compost Systems, Inc
Modular Sludge Composting			
(1)Cape May, NJ	6.3	Reg. discr.	Pandullo, Quirk & Assoc.
Sludge Composting			
Lexington-Fayette, KY	16.0	env. ben. & reliability	-
Jefferson Co., AL	35.0	-	-
Sludge Digestion			
Aerobic Digestion			
(1)Weiser, ID	2.3	env. ben.	CH_2M Hill
Anaerobic Digestion			
(1)Aroostook/Presque Isle, ME	1.3	energy	Wright-Pierce, Inc.
Dual Aerobic/Anaerobic Digestion			
Hagerstown, MD	8.0	cost & energy	Buchart-Horn
(1)Henderson, NC	4.14	env. ben. & reliability	-
Lackawanna, NY	4.5	reliability	Neussbuner, Clark & Velzy
"MISCELLANEOUS"			
Aerobic Fluidized Bed Reactor			
East Bay Dischargers, CA	13.1	-	CH_2M Hill

(1)Indicates that this facility is listed under more than one innovative technology.
(2)Indicates that this facility is operational.

TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Computerized Financial Management			
Passaic Valley, NJ	-	cost	Arthur Young & Company
Dissolved Air Flotation			
(1)Weiser, ID	2.3	env. ben.	CH_2M Hill
Earthen Pond System			
Quincy, CA	0.72	cost & energy	John Corollo Engineers
Enclosed Impeller Screw Pumps			
Westborough, MA	7.68	Reg. discr.	SEA Consultants, Inc.
Heat Pumps			
New York City, NY	110.0	-	SEA Consultants, Inc.
Chemical Air Scrubber Odor Control			
Western Lake Superior, MN	43.9	Reg. discr.	Southwest Survey Eng.
Powdered Activated Carbon/Regeneration			
Bedford Heights, OH	2.5	Reg. discr.	Dalton, Dalton, Little
Burlington, NC	9.5	cost	-
(1)El Paso, TX	10.0	env. ben.	Park, Hill, Smith & Cooper
Kalamazoo, MI	53.3	cost	Jones & Henry
Sauget, IL	27.0	Reg. discr.	Russell Axon & Assoc.
Primary Treatment Facility			
E. Millinocket, ME	0.5	cost	Camp, Dresser & McKee, Inc.
Sequencing Batch Reactor			
Grundy Center, IA	0.83	Reg. discr.	Clapsaddle-Garber & Assoc.
Swirl Concentrators			
Auburn, IN	1.7	cost	Howard, Needles, Tammen & Bergendoff
Toledo, OH	160.0	cost	Jones & Henry
Teacup Separator for Grit Removal			
Omaha, NE	46.0	Reg. discr.	Camp, Dresser & McKee, Inc.
Total Containment Pond			
Geralch, NV	0.03	cost	Walter & Beyer

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(2)Indicates that this facility is operational.

TABLE 1 -- INNOVATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE PROGRAM (continued)

Description of Technology/Grantee	Design Flow (MGD)	Basis of Approval	Design Consulting Firm
Tubular Screw Pumps			
(1)Aroostook-Presque Isle, ME	1.3	energy	Wright-Pierce, Inc.
Gardiner, ME	1.8	Reg. discr.	SEA Consultants, Inc.
Ft. Meade, FL	1.0	-	-
Windmill Compressed Air Aeration			
Menan, ID	0.218	-	Thompson Engineers, Inc.
Wind Turbine Generators			
Erie, NY	16.0	cost	-

(1)Indicates that this facility is listed under more than one innovative technology.
(2)Indicates that this facility is operational.

TABLE 2

A SUMMARY OF ALTERNATIVE TECHNOLOGY PROJECTS FUNDED THROUGH THE I/A PROGRAM

EPA Region	State	Wastewater									Sludge				
		Aquaculture	Containment Ponds	Direct Reuse	Overland Flow	Rapid Infiltration or Aquifer Recharge	Slow Rate (Irrigation)	Alternative Collection Systems	On-Site Treatment	Septage Treatment	90% Methane Recovery	Self-Sustaining Incineration	Composting Prior to Land Application	Drying Prior to Land Application	Land Application
I	Connecticut								2			1			
	Maine							4	5				7		
	Massachusetts					3	1	1	1	10	2	1	4		1
	New Hampshire								2	1					
	Rhode Island											1			
	Vermont						1	1	5						9
II	New Jersey							4		16	1		6	3	
	New York				4	3	3	25	3	2	12		4		
	Puerto Rico														
	Virgin Islands														
III	Delaware							2	3						1
	Wash., DC													1	
	Maryland						2	4							
	Pennsylvania						2	1							
	Virginia				2	1	1	5	1		2		1		3
	West Virginia							3			2				
IV	Alabama							1			1				2
	Florida			1		2	6				2				
	Georgia						5								4
	Kentucky							2	1		2		1		8
	Mississippi							2							
	North Carolina						7	3			1				1
	South Carolina					1	5								1
	Tennessee							2					1		
V	Illinois				1	1	2	5	3	1	3				10
	Indiana						1	5			1	1			4
	Michigan					6	8	4	3	3	1				11
	Minnesota						10	4	10	1	4				12
	Ohio						1	2			1		2		4
	Wisconsin					10	6	1	1		3				6
VI	Arkansas						3	9		2	1				
	Louisiana				1		5	6	2						1
	New Mexico		1				3								
	Oklahoma	17					17				1				
	Texas	1	4			1	8	4	1		4		1	2	2
VII	Iowa						4	2			1				12
	Kansas	23	1				6				5				12
	Missouri				5		4	12	1		2	1		2	13
	Nebraska	18			1		2				1		2		4
VIII	Colorado		1			1	3	1							1
	Montana	1				5	4				1				4
	North Dakota	6					3	4	1						
	South Dakota	5	1			1					1				3
	Utah						2								
	Wyoming	3				2	2								1
IX	Arizona	3	1	1		1	4				1				1
	California	2	5	2		14	16	10	4	1	3	2	1		3
	Guam	1				2									
	Hawaii						1								
	Nevada	3	1			1	1				1				1
	Pac. Islands														
X	Alaska														
	Idaho		1		1		6	4		1					2
	Oregon					1	4	2	1		2				3
	Washington	1	1				1	2	2		2				
TOTAL		1	85	16	18	56	160	137	52	38	64	7	30	8	140
Design/Construction		1	56	11	14	35	115	111	44	35	58	7	26	8	118
Operational		0	29	5	4	21	45	26	8	3	6	0	4	0	22

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM

Selected Operational Facilities

State	Community	Design Flow (MGD)	Design Consulting Firm
	WASTEWATER TREATMENT		
Containment Ponds			
AZ	Alpine	—	Ellis, Murphy & Hogate
AZ	Show Low	—	Johannessen & Gerald/Rod, Gomez
CA	Eastern Municipal	0.8	Neste, Brudin & Stone, Inc.
CA	Fall River Mills	—	Rolls, Anderson & Rolls
ID	Bruneau	0.025	Tudor Eng. Co.
KS	Lorraine	—	Evans, Bierly, Hutchinson & Assoc.
KS	McPherson	—	Wilson & Co.
KS	Salina	7.8	Wilson & Co.
MT	Gildford	0.023	—
ND	Kramer	0.01	Wold Engineering
ND	Marmath	0.014	North Central Consultants
ND	Martin	0.009	Houston Eng.
NE	Brainard	0.02	Johnson, Erickson, O'Brien & Assoc.

Selected Operational Facilities

State	Community	Design Flow (MGD)	Design Consulting Firm
NE	Broadwater	0.018	Baker, Sweeney & Assoc.
NE	Craig	0.03	Consolidated Engineers
NE	Edgar	0.098	Johnson, Erickson, O'Brien & Assoc.
NE	Harvard	0.01	—
NE	Maywood	0.032	Paul Mousel & Assoc.
NE	Overton	0.068	Great Plains Eng.
NE	Pleasant Dale	0.024	Johnson, Erickson, O'Brien & Assoc.
NE	Plymouth	0.045	Johnson, Erickson, O'Brien & Assoc.
NE	Stapleton	0.03	Bruce L. Gilmore & Assoc.
NV	Elko-Jackpot	0.237	J.V.V. Engineers
NV	Eureka	0.05	Chilton Engineers
OK	Dibble	0.04	—
OK	Fox Rural	0.032	Fox & Drechsler
OK	Manchester	0.02	—
OK	Mooreland	0.15	C. H. Guernsey & Co.
SD	Lake Norden	—	Schoell & Matson

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM (CONTINUED)

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
Direct Reuse			
CA	Cambria	—	Boyle Engineering Corp.
CA	El Dorado	—	Culp/Wesner/Culp
CA	Lake County	0.23	—
CA	Las Virgenes	8.0	Boyle Engineers
CA	Marin	2.7	Marin MWD Engineers
Overland Flow			
AZ	Alpine	—	Ellis, Murphy & Holgate
CA	Davis	5.0	Brown & Caldwell
CA	Newman	—	Brown & Caldwell
ID	Santa-Fernwood	0.1	J-U-B-Engineers
Aquifer Recharge or Rapid Infiltration			
AZ	Pima	30.0	Black & Veatch
CA	Bishop	—	Gram/Phillips Assoc.
CA	Boron	0.21	BPW Engineers
CA	Brentwood	—	CDM/KKA Assoc.
CA	Gilroy	—	Consoer Townsend & Assoc.
CA	Hilton Creek	—	Gram/Phillips Assoc.
CA	Hollister	—	CSO International, Inc.
CA	Julian	—	County of San Diego
CA	San Bernardino	0.21	CM Engineering Assoc.
CA	Soledad	—	Kennedy/Jenks Engs.
CA	Sonoma	0.067	Brelge & Race
CA	Whispering Palms	—	Neste, Brudin & Stone, Inc.
CA	Woodbridge	0.24	Darrhl Dentoni & Assoc.
CO	Sterling	3.9	ARIX
MT	Bozeman	5.75	Thomas, Dean & Hoskins
MT	Corvallis	0.051	Morrison-Maierle
MT	East Glacier	0.91	Kehnlein, Lightower & Johnson
MT	Plains	0.16	Scruton & Associates
MT	Three Forks	0.45	Thomas, Dean & Hoskins
NV	Tonopah	0.5	Phillsbury, Dew & Stowell
WI	Crandon	0.026	Donohue & Assoc., Inc.

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM (CONTINUED)

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
Aquifer Recharge or Rapid Infiltration			
WI	Hayward	0.68	Morgan & Parmley
WY	Jackson	3.5	ARIX
Slow Rate Infiltration			
AZ	Perry	—	Wm. H. Klingner
AZ	Benson	—	Duly, Johns & Assoc.
AZ	Colorado City	—	International Engineers
AZ	Naco	—	Duly, Johns & Assoc.
CA	Amador	—	Gretzinger & Weatherby
CA	Eastern Municipal	0.8	Neste, Brudin & Stone, Inc.
CA	Kern	—	Mason-Vancuren-Wachoh
CA	Lakeport	—	Gillett-Harris-Duranceau & Assoc.
CA	Las Virgenes	8.0	Black & Veatch
CA	Marin	2.7	Marin MWD Engineers
CA	Murphys	—	Gretzinger & Weatherby
CA	Newman	—	Brown & Caldwell
CA	San Bernardino	0.21	CM Engineering Assoc
CA	Scotts Valley	—	Harris & Assoc.
CA	Sierra Vista	29.0	Montgomery & Collins
CA	Tranquility	—	Harris & Giersch & Gong-Guy
CA	Tuolume	0.17	Spray Waste, Inc.
CA	Winters	—	Dewante & Stowell
CO	Cortez	—	—
CO	Steamboat Springs	—	Dismuke & Dismuke
FL	Leesburgh	3.0	—
FL	Niceville	2.0	Roy F. Weston
FL	Tallahassee	10.0	William Bishop, P.E.
ID	Ashton	0.15	—
ID	Mountain Home	1.95	James M. Montgomery
ID	Plummer	0.1	—
ID	Rexburg	1.0	Forsgren, Perkins & Assoc.
KS	Kinsley	0.24	Wilson & Co.

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM (CONTINUED)

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
Slow Rate Infiltration			
MI	Fife Lake	—	Granger Engineering, Inc.
MI	Hisperia	0.173	Williams & Works
MI	Kent City	0.075	Williams & Works
MI	Nashville	0.129	Williams & Works
MN	Beaver Bay	0.04	Mateffy Eng. & Assoc.
MT	Corvallis	0.05	—
MT	Eureka	0.16	—
MT	Roberts	0.24	—
NC	Faison	0.17	Boney & Newcomb
NC	Freemont	0.246	—
NC	Waxhaw	0.25	—
NE	Schuyler	0.7	Settle & Spear
NM	Eagle Next	—	—
OK	Elmore City	0.164	Settle & Spear
OK	Okarch	—	—
OK	Talala	0.03	McCaleb & Assoc.
OK	Brownsville	0.3	Kraus & Dalke, P.E.
OR	Haines	—	Anderson-Perry Assoc.
SC	Holly Hill	0.188	—
SC	S.C. Dept. of Corrections	0.54	—
WA	Goldendale	0.35	Brown & Caldwell
Alternative Collection Systems			
AL	Dallas Co.	0.9	Goodwyn & Mills
CA	Calistoga	—	—
CA	Manila	—	—
CA	Marin	—	—
CA	Santa Ynez	0.2	Montgomery Engineers
CA	South Lake Tahoe	—	Swanson & Oswald
CA	Ventura-N. Coast	0.071	—
ID	Avery	0.023	David Welch & Assoc., Inc.
IN	Hamilton Lake	0.3	C. E. Williams & Assoc.

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM (CONTINUED)

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
Alternative Collection Systems			
KY	Fancy Farms	0.3	Lenard A. Griggs & Assoc.
MD	Queen Annes	0.8	O'Brien & Gere Engs., Inc.
MD	Somerset	—	—
MI	Michigamme	0.042	McNamee, Porter & Seely
MI	Rudyard Township	0.077	McNamee, Porter & Seely
MN	Knife River	0.4	Stewart & Walker, Inc.
MO	Mokane	0.1	Williams & Works
MS	Cleary Heights	0.1	--
MS	Granada	0.06	Miller, Wihry & Lee
NC	Creswell	0.064	L. E. Wooten & Assoc.
NC	Waxhaw	0.25	--
TN	Belle Meade	0.325	Barge, Waggener & Assoc.
TX	East Cedar Creek	--	Johnson Eng. Co.
TX	West Cedar Creek	0.683	--
WA	Black Diamond	0.03	Kramer, Chin & Mayo, Inc.
WA	Eastsound	0.08	—
WI	Little Black	—	C. C. Crane, Inc.
On-Site Treatment			
CA	Taylorsville	0.045	—
CA	Tulane	—	—
ME	Isleboro	0.014	Edward C. Jordan Co., Inc.
MI	West Traverse	0.006	Williams & Works
NH	Weare	0.25	Anderson-Nichols
WA	Chelan	0.025	City of Wenatchee
WA	Eastsound	0.08	—
WI	Little Black	—	C. C. Crane, Inc.
Septage Treatment			
ID	Avery	0.023	David Welch & Assoc., Inc.
MI	Michigamme	0.042	McNamee, Porter & Seely
MI	West Traverse	0.006	Williams & Works

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM (CONTINUED)

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
SLUDGE TREATMENT			
90% Methane Recovery			
AZ	Flagstaff	—	Brown & Caldwell
CA	Contra Costa	—	CDM/KKA Consultants
KS	Topeka	20.0	Van Doren, Hazard & Stallings
MI	Charlotte	1.2	Capital Consultants
WA	Enumclaw	2.4	Kramer, Chin & Mayo, Inc.
WI	Waukesha	11.6	Alvord, Burdic & Howson
Composting Prior to Land Application			
ME	Old Town	—	James W. Souall Co., Inc.
ME	Portland	—	—
ME	South Portland	5.5	Wright-Pierce
NE	Falls City	0.52	Garber & Work
Land Application			
CA	East Bay	—	Jenks & Harris
CA	Las Virgenes	8.0	Black & Veatch
IA	Fairfield	2.8	French, Reneker & Assoc.

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
IL	Casey	1.2	Warren & Van Praaf, Inc.
IL	Dekalb	7.25	Beling Eng. Co.
IL	Hoopeston	0.8	Warren & Van Praaf, Inc.
KA	Abilene	1.68	Wilson & Co.
KA	Andover	0.6	Poe & Assoc.,Inc.
KA	Great Bend	3.64	Evans, Bierly, Hutchinson & Assoc.
KA	Nickerson	0.15	Evans, Bierly, Hutchinson & Assoc.
KA	Topeka	20.0	—
KA	Danville	2.7	—
MI	Charlotte	1.2	Capitol Consultants
MT	Butte-Silver Bow	—	—
MT	Kalispell	2.5	—
NE	Fort Calhoun	0.106	Dana, Larson, Roubal
NE	Kimball	0.724	John E. Olsson & Assoc.
NC	Tonopah	0.5	Phillsbury, Dewante & Stowell
SD	Brookings	—	Banner Assoc., Inc.

TABLE 3 - OPERATING ALTERNATIVE TECHNOLOGY FACILITIES
FUNDED THROUGH THE INNOVATIVE/ALTERNATIVE TECHNOLOGY PROGRAM (CONTINUED)

Selected Operational Facilities			
State	Community	Design Flow (MGD)	Design Consulting Firm
Land Application			
VA	Elkton	0.4	--
VT	Middlebury	2.2	Wright Engineering
WI	Denmark	0.5	--

TABLE 4

FEDERAL AND STATE I/A TECHNOLOGY
COORDINATORS AND CONTACTS

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TABLE 4 (continued)

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